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## Exploring environmental education

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### Recommended Citation

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**Exploring Environmental Education**

**Spring 2008**

**LS 400: Senior Capstone**

**Dr. Scott Waltz**

## **Introduction**

“In the end we will conserve only what we love, we will love only what we understand, we will understand only what we are taught.” This quote is from Senegalese conservationist Baba Diom and incorporates modern-day concepts of environmental education. Environmental Education, EE, is vital in protecting the environment. EE has been a world-wide priority and focus since the 1960’s. Scientists and citizens across the globe identified problems with the environment and sought to change the impact that humans had with destroying the environment. Scientists and researchers recognized the importance of global education to promote knowledge transfer, appreciation for nature and advocacy to protect the environment. The 1970’s brought many nations together to create common ideas and goals. One such meeting was called “The Belgrade Charter,” where nations created The Global Framework for Environmental Education. Many international groups were formed to strive to bring EE curriculums into schools across the globe. The United Nations has been instrumental in organizing nations to implement quality EE programs in their elementary, secondary schools and beyond. The United States passed the National Environmental Education Act of 1970 as a framework for American schools to follow and implement elementary education in schools across the country. Funding and timing hurdles have been implemented by other programs and often times environmental education in the United States takes the form of an extra-curricular activity or a summer adventure. I will show proven benefits of environmental education for students, families, the community and planet Earth.

Students involved in environmental education programs gain knowledge about the environment. They also perform better on assessments and tests compared to students who are not in EE programs. The knowledge that EE students gain and the skills they learn from solving problems and thinking critically boosts their self esteem and creates in them a positive self concept. The information and knowledge that they attain can be transferred to their parents and to the community. By educating the youngest members of society, there is a potential for every member to learn something as the information travels from the students to their parents and from the parents to their friends and communities. Once students know about the environment and have the abilities to understand and interpret the human impact that is causing problems in the environment, these students can make a change. These students' attitudes and behaviors change towards a positive view on the environment and they want to fix the problems and protect the environment. Through the interactions between humans, the hopes that EE will convey change in the current attitudes towards the environment and promote sustainable living and interactions with the environment is possible. How does a curriculum enriched with an effective outdoor environmental education program help students? What are the measurable benefits?

### **Academic achievement**

Students involved in environmental education programs are gaining knowledge about the environment, nature and ecosystems. Additionally they learn about problems facing the environment and ways to counteract human impact and improve nature. Environmental educators from forty schools across the country reported to Lieberman and Hoody (1998) that their students gained knowledge and understanding of science content, concepts, processes, and facts as well as an ability to apply science to real-world solutions. Vaughan, et al (2003) found that students in EE classes retained the information and concepts that they learned eight months earlier in an EE class. Almost all of 294 students participating in an EE class reported that they had learned something from the class (Ballantyne, et al, 2001b). Children involved in EE programs gained knowledge about the world around them and were able to express a part of the environment that is foreign to their every day lives (Bowker, 2007). Sixth graders in an urban EE program showed an increase in knowledge from a pre-program test to a post-program test (Euler, 1989). Environmental education programs are providing students with quality information and knowledge that they are gaining from and retaining. These concepts and pieces of knowledge will stay with them throughout their lives. Their abilities to learn about the environment will continue to help them learn, improve and thrive in other areas of knowledge.

Students' cognitive learning is benefited by environmental education (Howie, 1974). Everything I've read shows positive signs that students in EE classes are performing as good as or better than students who are not in EE classes. Proficiency levels for students in environmental education programs perform higher than state

averages. All subjects and areas of study improve and students in EE classes are testing higher across the board. A nation-wide survey undertaken by Bogo (2003) comparing EE students to students in traditional classes shows 92% of EE students had higher math skills, were more successful communicators and had better abilities to relate concepts to real-world situations. The EE students were stronger problem solvers, had better thinking skills and all of them were measurably better at science than students who had not experienced EE classes (Bogo, 2003). Washington state high school students in EE classes scored higher on science standardized tests than those in non-EE classes (Bartosh, 2005). Louisiana fourth graders in EE classes were twice as likely to achieve scores above the unsatisfactory level compared to state performance (Athman, 2001). Students in classes that have all subjects integrated with environmental topics performed better for all assessments in reading, math, language and spelling (Lieberman, et al, 2005). Students at a California elementary school with an environmental approach to their curriculum have the highest scores in the county on all comprehensive and assessment tests (Stoner, 1989).

There is substantial evidence of EE students performing well in many subjects. A twelve year long study by Bogo (2003) identifies New England EE students increasing test scores from grade three to grade six compared to their peers who did not have EE classes whose test scores did not improve through those grade years. Emekauwa (2004) surveyed 19,000 students involved in an EE program in Alaska implemented by the state government. Students involved in the state-wide program moved into the highest quartile and out of the lowest quartile of scores in state assessments (Emekauwa, 2004). Students

in Louisiana schools that offered environmental education classes moved out of unsatisfactory levels at a rate four times more frequently than students in schools that did not offer environmental-based curriculum (Athman, 2001). EE students in Washington state schools outperformed their peers in reading and writing in state administered standardized tests (Bartosh, et al, 2005). Environmental education programs give students the abilities to learn and retain knowledge which are skills that students can bring to all classes and achieve academically. The achievement that students ascertain leads them to perform better in school.

Students in environmental education classes perform better in school, have higher GPA's, attend school more frequently and have higher promotion rates. GPA's of students in Washington state yearlong EE classes improved over the course of the year (Bartosh, 2005). Bartosh (2005) identifies that students in the same schools who were not involved in EE classes did not raise their GPA's as high. Something in the EE classes gave the students the ability and opportunity to increase their GPA's. Results of Bartosh's observations were controlled for differences in pre-program levels, gender and education goals. This study is very reliable and significant to show that EE students are indeed performing better than non-EE students. Lieberman and Hoody (2005) analyzed data from students in environmental education classes and students who were not in environmental education classes to compare their GPA's and attendance records.

Students in environmental education classes had better scores on standardized tests, better GPA's and attended school at a higher rate than those students who were not in EE classes (Lieberman and Hoody, 2005). Schools with environmentally based curriculums

had better attendance records more than three-fourths of the time (Lieberman, et al, 2000). Attendance records suggest that students in environmental education classes attend school more often. Emekauwa (2004) observed that the dropout rate of Alaskan students involved in the state-wide EE programs was reduced. The dropout rates of students who were not involved in EE classes stayed constant (Emekauwa, 2004). The rate of students from the EE classes entering the University of Alaska as first-time freshman increased by 50% from 1995-2001 (Emekauwa, 2004). Cambodia reports growth in enrollment and promotion rates, a decrease in dropout rates and better teacher quality resulting from their nation-wide environmental education program (Bhandari, 2000). GPA and attendance rates of students who are involved with environmental education classes are promising. A clear advantage to EE programs is that they retain students, encourage them to attend school, enable them to score higher on tests and attain higher GPA's than students who are not involved in EE programs.

### **Improvement of “self”**

Students gain self esteem and confidence through environmental education programs because they challenge them to think on new levels and solve problems that lead to gratifying results for the student's sense of self. Lieberman and Hoody (2005) compared students in EE classes to students in traditional classes from 14 schools and found that 92% of teachers report the students in EE classes to have improved attitudes towards school. These teachers recognized that their students in EE classes were positive about being at school and participating in class discussions (Lieberman and Hoody,



2005). A majority of these same teachers reported observing a decline in discipline and behavior problems with students involved in EE classes (Lieberman and Hoody, 2005). Harris (2000) created a test to enable students to measure their self concept before and after participating in an EE program. Test results reveal that these students' self concept increased by 75% after experiencing an EE class. Harris (2003) found similar results three months after the EE class ended. Harris (2003) also tested a group of students who did not participate in the program and observed that these students had constant levels of self-concept consistent during the duration of testing (Harris, 2003). Gillett, et al (1991) also observed an improvement in students' self-concept. These students participated in a one week intensive nature trip and came out with improved self-worth (Gillett, et al, 1991). Giving children an opportunity to engage in environmentally related coursework will boost their self concept.

Problems and concepts presented in EE programs allow students to gain the ability to think critically and solve problems. A good EE program helps students understand the information, resulting in improved conceptual thinking and problem solving skills (BouJaude, 2003). Teachers observed an increase in critical thinking skills and an enjoyment of thinking critically among s group of high school students in EE classes (Ernst, 2004). Students involved in EE programs display improved thinking skills and scored higher on the Cornell Critical Thinking Test than students who were not in EE classes (Athman & Monroe, 2004). Students in a state-wide Hawaiian EE program performed better on a state critical thinking test and environmental literacy test than non-EE students (Cheak, et al, 2002). When students understand the relationships between

constructed habitats and nature they begin to think critically about human impact and appreciate nature (Faber, 2002). The skills to think critically and solve problems acquired through EE classes extend past these classes and benefit students in all aspects of schooling and in their everyday lives.

Quality EE programs give students an ability to think for themselves and overcome hurdles. Children who use critical thinking skills in EE programs to solve problems gain an improvement in their concepts of themselves (Williams, 1975). Chapman (2000) studied special needs students in an environmental education program and found that each of them had positive reactions to their experiences. Using a test to measure self image concepts before and after the program, Chapman (2000) found that each of the students experienced a boost in self esteem; the highest boosts were observed in the students who began with the lowest levels of self esteem. The students identified that they felt like they had more friends and more trust in others as well as feeling happier and more successful after engaging in the EE program (Chapman, 2000). A nature program improved these students' concepts of themselves and their trust in others because it allowed them to have adventures in their studies and an opportunity to solve problems.

While students gain a boost in their self concept, their motivation increases. Extrinsic motivation, commitment, self-determination and positive environmental behaviors were observed in students involved in EE programs (Legault, 2004). Students develop self-esteem, confidence, motivation, cooperation, trust, communication skills and

the ability to critically think and solve problems after participating in quality environmental education programs (Cooper, 1994). Staff from Washington state schools report that students who attended EE classes had higher motivation, self confidence and less behavior and discipline problems (Legault, 2004). Over 90% of teachers reported to Lieberman and Hoody (2005) that they observed students' growing motivation to learn and enthusiasm for science, mathematics, social studies and language arts. Students in EE classes scored higher on the California Measure of Mental Motivation Inventory than non-EE students. Environmental education fosters motivation to attend school and to learn in positive manners.

Some pieces of literature have explored the concept of EE programs extending work experience to individuals who turn their EE experience into a career. Tanner (1980) explored autobiographies of adults working in conservation and found that they were led to the field of conservation because of very diverse reasons. Among others, conservationists expressed that they were led into the career of conservation because of their experiences in environmental education programs as youths of influence of science teachers and school (Tanner, 1980). Palmberg (2000) surveyed autobiographies of environmental educators in the United Kingdom and found common links between them. Many of them said that they were inspired to become environmental educators because of their experiences as children with environmental education and coursework (Palmberg, 2000). Adults have had the benefit of EE and been able to make lucrative careers from their EE experiences. Grassi, et al (2004) surveyed high school students involved in environmental service-learning classes across Colorado. These high school students

reported gaining work experience, job skills and career awareness through their experiences with environmental service learning in their education (Grassi, et al, 2004). Quality experience with environmental education will lead to another generation of inspired adults who choose careers related to the environment.

### **Transfer of Information**

Discussions between parents and children who are involved in EE classes have positive outcomes for the environment. Parents need to be involved in their children's education for effective change in attitudes and behaviors about the environment (Uzzell, 1994). Children can influence their parents' attitudes and behaviors by sharing environmental knowledge with them (Duval, 2007). A majority of parents in a Costa Rican village were able to answer questions about an EE packet their children brought home (Sutherland and Ham, 1992). It is imperative that students share the information that they are learning in EE classes with their parents to involve them in their education and experience. Parents report that they gained knowledge from their children who were in EE programs (Kahn, 1996). These same parents agree that they need to work with the schools to institute the program effectively (Kahn, 1996). They feel like their involvement with the program will improve the program and motivate their children to become fully involved to gain the most from the experience. Bhandari (2000) observed parents in Cambodia with children in EE programs who are involved with their children's schoolwork and take information from their children. These parents have a great and

positive impact on environmental resources using the knowledge they gained through discussions about the EE courses with their children (Bhandari, 2000). The influence that children have on their parents can lead their parents to gain knowledge and experience which will lead to changed attitudes and behaviors.

Students involved in EE classes give their parents knowledge about the environment that they have learned and encourage their parents to get involved and make innovative changes using teamwork with children and other adults. Parents have the desire to protect the environment for future generations after discussions with their children in EE programs (Ballantyne, et al, 2001b). Environmental problems are solved when students in EE programs work with their parents to discuss the problems and ways to solve the problems (Ballantyne, 2006). Parents involved in an EE program with their kids showed an increase in concern for the environment and reported interest in changing to pro-environmental behaviors (Leeming, et al, 1997). Using skills learned from EE programs, parents and children discussed problem-solving strategies for environmental problems and ways to change household strategies to help the environment (Ballantyne et al, 2001a).

The information that parents receive from their children will be spread to friends and neighbors. It's important for parents of children in EE classes to discuss environmental topics with parents who do not have kids who are involved in EE classes to better spread the information. Vaughan, et al (2003) observed parents with children in an EE program in Costa Rica gaining knowledge in EE topics. After administering a pre-

test and post-test, Vaughan, et al (2003) measured 52% improvement in knowledge after parents were encouraged to participate in discussions with their EE students at home.

Three months later, these parents and a control group of parents were tested on the same information and the control group parents improved by 29% on the test, giving evidence that the knowledge was transferred through the community from parents to other parents who didn't have the chance to discuss EE with their kids (Vaughan, et al, 2003). After EE classes, students and parents increased their engagement within the community and shared knowledge with others (Grassi, et al, 2004). Schools that involve parents allow access to community participation and support of local action from all (Uzzell, 1994).

When children are encouraged to discuss environmental problems with adults, the community can become involved and build around the issues with the environment (Ballantyne, 2006). Youth involved in Friends of the LA River, FoLAR, teach the community about the river's ecosystems and environmental dangers it faces (Faber, 2002). These programs promote education and advocacy for the river (Faber, 2002).

Children involved in EE are given the tools and information to share with the community and encourage positive interactions with the natural world. Parents are learning about environmental problems and changing the way they act and spreading the word to engage the community in a transfer of knowledge and actions. With enough transferring of knowledge and experience, entire communities will have knowledge about environmental topics and will be able to work together to create positive change to human impacts on nature.

### **Stewardship and Advocacy**

Once students begin to learn about the environment and attain problem solving and critical thinking skills, they might have concern for environmental problems. They can create a relationship to the earth that will make them want to protect it. Using the skills that EE programs have given them, they can search for and create real-world solutions to the problems that the environment faces. The beginning of the stewardship that students feel begins with the knowledge that changes their attitudes about the environment. Third grade students expressed a more positive attitude towards nature after participating in an EE program (Jaus, 1984). These students' positive attitudes continued through the period of the observation which lasted until they were in the fifth grade (Jaus, 1984). A short intensive EE program focusing on nature improved student's attitudes about nature (Gillett, et al, 1991). Sixth graders in an environmental education programs showed positive opinions and attitudes about the environment (Euler, 1989). Students in a program that promoted nature and the environment had a greater change in attitudes about the environment than a control group of students who took the same pre and post assessments during the timeline of the program but did not participate in the program ( Leeming, et al, 1997). Hungerford and Volk (1990) suggest that it is important to continue environmental education programs for students to sustain positive attitudes for the environment in the kids. This shows that longevity in environmental education is important to create students who are environmentally conscious and educated. Students involved in an EE program gained knowledge and information as well as learning how to monitor and solve problems in the environment (Ballantyne, et al, 2001b). These students' attitudes and behaviors changed because of their experiences with monitoring

and solving problems (Ballantyne, et al, 2001b). Most parents of these students report that they've identified changes in their kids (Ballantyne, et al, 2001b). Their children exhibit an awareness and interest for the environment and changes in attitudes and behaviors towards the environment (2001b). Stoner (1989) presented a CA elementary school that successfully implemented a curriculum completely based on the environment. Every subject was integrated with environmental learning. The program developed students' knowledge, understanding and appreciation of the human relationship with nature (Stoner, 1989). The things that students are learning through environmental education are causing them to change their way of thinking about the environment. These changes are from the connection that environmental education builds in them with nature.

Most environmental education programs are structured to inform students about the environment. Ways to form connections between humans and the Earth are presented. Additionally, human interactions with nature and problems in the environment are discussed and students tend to feel concern about these problems. Environmental education gives them the ability to problem solve and these students tend to change their attitudes and think critically about solutions to the problems. A great benefit of environmental education is that students participating in environmental education programs exhibit stewardship behavior. Children with access to information through booklets about water treatment understood the problem and had more concern for the problem than non EE students had (Uzzell, 1994). Uzzell (1999) says that the further along a student goes in an environmental education program, the more severe their



concern for the environment will be. This makes absolute sense because these students gain the knowledge and information about the environment and about the problems. Through the programs, they form a bond with the environment and appreciate nature. They begin to care about the problems and are concerned about the environment. Students gain knowledge and self-determination while being dissatisfied with environmental conditions and behaviors (Green-Demers, et al, 1997). These students are taught the problems and the causes of the problems and want to create change. Students feel a sense of ownership of the world and they feel their responsibility to protect the world (Battersby, 1999). Students are given all of the basic tools that EE has to offer and then they are presented with information about problems that have been caused by humans and the students feel an obligation or an empowerment to want to change their behavior and work for change.

Cambodian students have a respect for nature and life. They have an appreciation for natural resources and simple living along with a sense of personal responsibility and gratitude for the gifts of nature (Bhandari, 2000). Children want to help the environment because of what they learn in environmental education programs (Williams, 1975). Environmental education helps children find a connection to nature so they want to participate in conservation (Sobel, 1996). Environmental education promotes children bringing a change to human effects to nature (Smith, 2005). With the knowledge of the environment, children have an appreciation for the environment and want to protect something that they appreciate and study. Environmental education helps students understand their interactions with the natural world (Duvall, 2007). Students who

participate in environmental education classes form ideas and values to improve and protect the environment (Duvall, 2007). Palmer (1998), a leader in advocating and studying EE says that environmental education shapes the relationship that humans have with the universe. Environmental education teaches children the importance of the world around them (Palmer, 1998). Environmental education is succeeding in informing young people and creating people who want help change the world and make the environment a healthier place.

Environmental education programs give students the chance for hands-on learning. With the basic concepts of the environment and skills to solve problems and think critically, students can create projects to improve the environment and change the way humans act towards nature. Youth involved in the program, Friends of the Los Angeles River, FoLAR, were inspired to protect their local environment after learning about the river's ecosystem (Faber, 2002). They studied, monitored and sketched the local flora and fauna (2002). They also measured and monitored the toxicity levels in the water and examined other problems with the river (2002). Their studies led them to want to create change and now they teach the community about the river and the problems that effect the ecosystem (Faber, 2002). The students involved in the FoLAR program are a great example of people who have benefited from EE. They are creating knowledge, change and a transfer of information to improve the environment. High school students in CA measured, mapped and sketched the flora and fauna of the King's River (Howland and Becker, 2002). When the local government wanted to build houses on the land surrounding the King's River, these students informed politicians about the river's

ecosystem and the importance of keeping the land intact for the flora and fauna to thrive in their natural home (Howland and Becker, 2002). The politicians took the information seriously and made the land into an ecological preserve (Howland and Becker, 2002). These students used their knowledge and skills learned from environmental education and used them to make a great difference and save an ecosystem that could have easily been destroyed by humans like so many ecosystems in other places have been destroyed without a second thought.

Students in Vermont used their experience to protect the environment. A group of fifth and sixth graders in an environmental-based class studied a river in Vermont (Howland and Becker, 2002). They took measurements and monitored the river (Howland and Becker, 2002). Their teacher has created a database with the measurements and information that they have collected so local monitoring and conservation of the river can continue (Howland and Becker, 2002). Students in other parts of the country are creating databases of relevant scientific information that can be used for assessment of resources and creation of policy (Howland and Becker, 2002). These student-created databases are tangible results of environmental education programs that are teaching students about the environment effectively and creating people who want to make a change.

Environmental education produced high school students in Colorado who studied a strip of land along the Colorado River and took measurements and monitored the life in the area (Bogo, 2003). These students put together and building plan for the city council

who wanted to build a strip mall along the river (Bogo, 2003). City officials followed the plan and suggestions of the high school students who had studied the land and knew what they were talking about. Bogo (2003) also uncovers Pennsylvania middle schoolers who collected data from a local creek and found that severe pollution was in the water. They traced the pollution to an old sewer system (2003). The local government did not have the funds to repair the sewers so the students spent three years taking measurements and voicing environmental and health concerns to the state until the state awarded a grant for the repairs (Bogo, 2003). These children were able to influence adults to protect and improve the environment. Humans can be agents of change and the main structure of EE programs promotes change and advocacy.

## **Conclusion**

There is a breadth of benefits to a quality environmental education programs. Students gain knowledge and perform better in school. Students in EE programs learn how to think critically and solve problems which are skills that they will be able to use throughout their lives in many situations. These students will see an increase in their self concepts and feel good about themselves and about what they are capable of. When EE students open the lines of communication with their parents and the community, their parents can learn about the environment and be influenced to change the way they think about and act towards the environment. Environmental education students appreciate nature and strive to make it better. By creating quality environmental education

programs for young people, leaders are enabling a generation to become involved and make changes. These changes will protect the environment for the current generation and for sustaining generations to come.

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